

AMENDMENTS TO THE CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

Listing of the Claims:

1. (Previously Presented) An ink-jet printhead, comprising:
an ink chamber to be filled with ink and an ink channel to supply the ink chamber with ink, the ink chamber and the ink channel formed in a passageway plate;
a cover plate provided on the passageway plate;
an ink ejection hole formed through the cover plate at a position corresponding to the ink chamber;
a condenser lens provided on a bottom surface of the passageway plate at a position corresponding to the ink chamber; and
laser beam irradiating means for irradiating a laser beam through the condenser lens and passageway plate into the ink chamber, directly energizing the ink contained in the ink chamber,
wherein a surface of the ink is vibrated by a pressurized wave generated by the laser beam, and a vibration causes an ink droplet to be expelled through the ink ejection hole from the surface of the ink.
2. (Original) The ink-jet printhead as claimed in claim 1, wherein the passageway plate is formed of a silicon substrate that is transparent with respect to an infrared ray.
3. (Original) The ink-jet printhead as claimed in claim 2, wherein the laser beam irradiating means is an infrared laser.

4. (Original) The ink-jet printhead as claimed in claim 1, wherein the passageway plate is formed of a glass substrate.
5. (Original) The ink-jet printhead as claimed in claim 1, wherein the condenser lens is integrally formed with the passageway plate.
6. (Original) The ink-jet printhead as claimed in claim 1, further comprising:
a lens plate provided on the bottom surface of the passageway plate, the lens plate including the condenser lens.
7. (Original) The ink-jet printhead as claimed in claim 1, wherein the laser beam irradiating means is a semiconductor laser.
8. (Original) The ink-jet printhead as claimed in claim 1, wherein the condenser lens is convex shaped.
9. (Original) The ink-jet printhead as claimed in claim 1, wherein the ink chamber is a plurality of ink chambers positioned at predetermined intervals in the passageway plate, the ink ejection hole is a plurality of ink ejection holes, each formed at a location corresponding to one of the plurality of ink chambers, and the condenser lens is a plurality of condenser lenses, each formed at a location corresponding to one of the plurality of ink chambers.

10. (Previously Presented) The ink-jet printhead as claimed in claim 9, wherein the laser beam irradiating means comprises:

a semiconductor laser for selectively irradiating the plurality of ink chambers and
a light path controller for controlling a path of a laser beam emitted from the semiconductor laser.

11. (Original) The ink-jet printhead as claimed in claim 1, wherein the cover plate is a silicon substrate.

12. (Original) The ink-jet printhead as claimed in claim 1, wherein the cover plate has a hydrophobic surface.

13. (Original) The ink-jet printhead as claimed in claim 1, wherein the ink ejection hole has a shape selected from the group consisting of circular, oval and polygonal.

14. (Original) The ink-jet printhead as claimed in claim 1, wherein the ink ejection hole is sufficiently large to prevent contact between the ink droplet being expelled and the cover plate.

15. (Currently Amended) A method of expelling ink, comprising:
filling an ink chamber with ink;
irradiating a laser beam directly onto the ink contained in the ink chamber to generate a pressurized wave in the ink and vibrating a surface of the ink using the pressurized wave;
and
~~increasing amplitude of the pressurized wave in the ink to expel~~ expelling an ink droplet from the surface of the ink by the vibration of the surface of the ink.

16. (Previously Presented) The ink expelling method as claimed in claim 15, further comprising:

converging the laser beam using a condenser lens before irradiating the laser beam directly onto the ink.

17. (Previously Presented) The ink expelling method as claimed in claim 15, wherein the laser beam has a sufficiently high energy and is irradiated directly onto the ink for a sufficiently short period of time to prevent boiling the ink.

18. (Previously Presented) The ink expelling method as claimed in claim 15, wherein the ink chamber is a plurality of ink chambers and irradiating the laser beam directly onto the ink comprises:

selectively irradiating the laser beam directly onto ink contained in one or more of the plurality of ink chambers.

19. (Previously Presented) The ink-jet printhead as claimed in claim 1, wherein the ink droplet expelled through the ejection hole includes ink existing in a liquid state.

20. (Previously Presented) A method of controllably expelling ink onto a recording medium, comprising:

controllably energizing ink in an ink chamber to generate a pressurized wave in the ink and to cause a surface of the ink to vibrate such that an amplitude of a wave on the surface of ink increases and to cause a liquid ink droplet to be expelled away from the surface of the ink before the ink reaches a boiling state by limiting an amount of energy being supplied directly to the ink to an amount sufficient to generate a pressurized wave.

21. (New) The ink-jet printhead as claimed in claim 1, wherein:
the laser beam irradiating means includes a laser and a light path controller, and
the laser and the light path controller are configured to control an energy of the laser beam to generate a pressurized wave in the ink and to cause a surface of the ink to vibrate such that an amplitude of a wave on the surface of ink increases and to cause a liquid ink droplet to be expelled away from the surface of the ink before the ink reaches a boiling state by limiting an amount of energy being supplied directly to the ink to an amount sufficient to generate a pressurized wave.
22. (New) The ink expelling method as claimed in claim 15, wherein irradiating the laser beam directly onto the ink includes irradiating the laser beam through a passageway plate that forms a wall of the ink chamber.
23. (New) The ink expelling method as claimed in claim 22, wherein:
the passageway plate is silicon, is in contact with the ink, and is disposed between ink in the ink chamber and the laser beam,
irradiating the laser beam directly onto the ink includes irradiating the laser beam through the silicon passageway plate, and
the silicon passageway plate is transparent to the laser beam.
24. (New) The ink expelling method as claimed in claim 23, wherein the laser beam has a wavelength in the infrared region.
25. (New) The method as claimed in claim 15, wherein the ink in the ink chamber transforms the laser beam into the pressurized wave.

26. (New) The method as claimed in claim 20, wherein:

a passageway plate forms a wall of the ink chamber, the passageway plate being in contact with the ink and disposed between ink in the ink chamber and an energy source that supplies the energy directly to the ink, the passageway plate being transparent to the energy, and

supplying the energy directly to the ink includes passing the energy through the passageway plate.

27. (New) The method as claimed in claim 26, wherein:

the passageway plate is silicon, and
the energy is infrared light.